Field Assembled ELECTRONIC AIR CLEANER

AIR BOSS Model 60 Series

without

Integral Washing System

- INSTALLATION
- OPERATION
- SERVICE

For Model Numbers

60- ___-01

Electrostatic Precipitators for Commercial & Industrial Applications

TRION® air purification systems

A FEDDERS® ENGINEERED PRODUCTS COMPANY

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SECTION I DESIGN

FOR THE SYSTEM DESIGN ENGINEER

1. General Description

Model 60 equipment consists of factory-assembled components to be "built-up" in the field into a completed unit. Depending on the system requirements, the installation may consist of a single unit or a multi-section unit. A multi-section unit is simply two or more single units placed side-by-side.

The factory-assembled components are designed to be mounted on a field prepared pad in the form of a drain basin, typically constructed of poured concrete.

The standard major components supplied with each unit for installation are as follows:

A. Framework – Support members, complete with sheet metal panels on the top and sides, to receive and locate the ionizing-collecting cells.

B. Ionizing-Collecting Cells – The elements used to remove and collect the contaminants from the air stream.

C. Control/Power Supply Box(s) – Located in the control enclosure and converts 115VAC to the high voltage DC required to energize the ionizing-collecting cells.
The programmable logic controller (PLC) electrically sequences the washing operation. The Pulse Width Modulated (PWM) power supplies, providing the necessary high voltage for the air cleaner and the controls initiating and sequencing the wash cycle are furnished in a NEMA 12 enclosure designed for remote mounting. The distance between the controller and unit must be determined as the interconnecting high voltage leads are furnished to the specified length. Consult factory for distances greater than 50 ft. Cables are not to be spliced at any point along their length. In addition, the enclosure is a central junction for the primary wiring.

D. Accessories – Electrical interlocks, lights and switches for safety and monitoring.

Note: Trion Tridex Detergent is specially formulated for use with Trion electronic air cleaners. Use of other cleaners and detergents, not specifically approved by Trion, will cause possible failures in the unit and will void any and all warranties on our equipment.

2. System Design and Floor Layout

The arrangement of the supplied components and the general layout of the system will vary according to application, adjoining equipment and available space. However, there are several basic factors pertaining to all installations that must be considered:

To maintain the selected cleaning efficiency, it is important to assure that the total air volume (capacity in CFM) is uniformly distributed across the entire face area of the unit. However, since most air ducts are designed to handle air velocities greater than the rated velocity of the air cleaner, it is necessary to properly transition any attached ducting. If possible, a contraction ratio of 1 in 3 (approximately 20°) should be maintained. If space prohibits, turning vanes, air baffles or other means may be utilized. Ducting – where attached to the sheet metal panels – should be gasketed, caulked or otherwise made water and airtight.

When there is a danger of rain, snow or debris being drawn into the system with outside air, the make-up air intake should be protected with rain louvers, hooding and hardware cloth to prevent the rain, snow or debris from entering the electronic air cleaner.

Contaminants to be collected – such as oils in vaporous state – must be condensed into particulate form prior to entering the ionizing-collecting cells in order to maintain the anticipated efficiency. Gases, vapors or any non-particulate cannot be precipitated and will therefore pass through the air cleaner. Any condensing that takes place downstream from the air cleaner defeats the purpose. By the same token, heavy concentrations of water vapor, or other matter that becomes highly conductive when condensed, must be prevented from entering and/or condensing in the collecting elements to prevent electrical arc over and shorting.

SAFETY NOTE:
Factory designed access to all electrically charged high voltage components contain electrical interlocks for the safety of operating personnel. Any additional access that may be provided in the system, where there is access to high voltage, must be equipped with such interlocks. Interlocks are readily available from the factory.

A foundation and drain basin design must be provided to carry off the wash water used to clean the ionizing-collecting cells. It is suggested that a new concrete basin be poured prior to the scheduled shipment of the hardware. Refer to Figure 3, Recommended Foundation and Drain Basin Layout Drawing.
Serious consideration should be given to any deviation from the suggested design, which would result in improper drainage, leakage, air bypass and mounting.

In addition to the governing plumbing codes, the following points should be considered in the construction of the basin.

A.) Drain lines must be of adequate size to carry off the required amount of detergent/wash water used. Refer to the piping schematic drawing, Figure 4.
B.) Drain lines must be suitably trapped and vented to prevent line gases from entering the air handling system.

C.) The basin floor should be properly pitched and finished to prevent puddling.
D.) The cross members containing the anchoring studs to receive the air cleaner base frame must be even and level to provide a proper foundation for the metal framework base.

Where the installation site is not suitable for a poured concrete basin, rust resistant metal pans may be used. The metal should withstand the weight of service personnel in addition to the weight of the unit.

Each installation varies according to needs, but normally the controller is located near the air cleaner. Ideal mounting height is at eye level for ease in reading the instrumentation and to facilitate service.

For ease in maintenance and component removal, adequate space, **39" Minimum Required**, must be provided in front of all access doors, motors, pump and accessory equipment.

3. Outdoor Installations
Requirements for outdoor protection vary in accordance to climate and equipment component arrangement for the particular job. The best approach, for equipment protection, is the construction of a heated shed or building over the installation. As an alternative, the installing contractor should treat the equipment as required to meet the specific needs.

Controller/PWM Power Supplies
As the controller/power supplies are designed for remote mounting, they can be, in many cases, located indoors and still be reasonably close to the main cabinet. If located outdoors with the cabinet, it must be weather protected.

Contact the local Trion Sales Office or the factory if questions arise, or any additional information is required.

SECTION II INSTALLATION

FOR THE INSTALLING CONTRACTOR

1. Unpack and Inspect
At the time the unit is received, all shipping containers and their contents should be examined for damage. Any damage occurring in shipment must be immediately reported to the carrier, an inspection report completed and a claim filed at the receiving point.

The number of shipping containers included in the shipment is dependent upon the unit size and type. When packaging the material for shipment, consideration is given to grouping the components into the installation categories in which they will be used. The packing list included with shipment identifies the various items to a specific box number. In general, the grouping is as follows:

(A) Framework

(B) Ionizing-Collecting Cells

(C) Controller with Power Supplies

(D) Accessories

For the protection of the components, it is recommended that those materials not immediately needed for installation be stored in the container in which they are received in a safe, dry and clean location. This is particularly true with the ionizing-collecting cells, which may be damaged when not properly handled.

2. Assemble Framework
The base frame, two sides and top are match marked on the air entering side of the air cleaner at the factory prior to shipment. See Figure 5.

(A) Position the base frame on the drain basin. Make sure it is located with the marking "BOTTOM FRONT" on the air entering side. The anchoring studs in the drain basin should be located on the inside of the frame channels and the entire frame should be level. Shim as necessary.
(B) Secure the base as illustrated. It is important that the studs do not protrude above the base frame channel. Cut top of studs, if necessary. Each anchor should be treated to prevent rust.
(C) Attach the side and top panels, match marking where the pieces join on the air entering side; A to A, B to B, etc. The required fasteners are packaged and marked for the framework.
(D) After the outside frame structure is complete, position and secure the intermediate cell supports. The side to receive the air bypass strips marked "FRONT" should be positioned toward the air entering side.

3. Attach Adjoining Ductwork
Depending on the application, the installation plan may or may not call for adjoining ductwork on the air entering and/or air leaving sides of the cabinet.

When adjoining ducting is to be installed, attach to the flanges on the air entering and air leaving sides of the unit. Maintain structural squareness during attachment.
The seam should be made air and watertight by caulking or gasketing.
The seam between the concrete drain basin and the metal work must be caulked or grouted to form a good watertight seal.

When a blower is installed downstream from the Trion cabinet, the ducting between the cabinet and the blower

will be under negative pressure and should be made air tight to prevent infiltration of contaminated air.

After the ductwork has been installed, clear remaining material or debris from inside ducts and bottom of cabinet.

4. Install Ionizing-Collecting Cells

Before placing the ionizing-collecting cells into the framework, the electrical cell-to-bus connectors must be inserted through the holes located in the flanges of the end plates and secured into place. There are two connectors per cell, one short collector standoff and a long ionizer standoff. Connect the bus bars and cell wiring as shown on Figure 6, 6A, 6B and Figure 7.

NOTE: Follow the directional arrows located on the cell end plates. The side of each cell containing the spiked ionizer blades must be located on the air entering side of the cabinet.

5. Install Air By-Pass Baffles

The air baffles provided are to be secured to the air entering side of the unit to block off the air gap between the frame and the top and the sides of each cell. They are secured into place with the screws provided. The vertical baffles for the cell ends are all rubber backed. The horizontal baffles across the top of each cell are plain. There are different sizes of each. Refer to Figure 8 and 8A for the arrangement.

6. Connect Drain

Connect a drain line to the pipe coupling in the cabinet drain basin in accordance with the governing plumbing codes. The drain line must be sealed with a trap or other means to prevent air by pass. If a trap is used, it should hold sufficient water column to overcome the system air pressure and to assure that loss of liquid from evaporation between cleaning periods will not break the seal. The drain line should not be smaller than the drainpipe coupling, or it will otherwise restrict the flow of water.

7. Mount Controller

The Controller should be mounted at eye level and located as close to the air cleaner as practical. It must be mounted indoors out of the weather unless supplied with a weatherproof cabinet. Allow sufficient space in front of the access door(s) for service. Refer to appropriate Control/Remote PWM Box Outline Drawing for mounting hole layout and dimensions.

8. Complete Wiring

A. *High Voltage Wiring*

WARNING:
EXERCISE ALL THE NORMAL PRECAUTIONS WHEN WORKING WITH HIGH VOLTAGE AND COMPLY WITH NEC AND ALL APPROPRIATE LOCAL CODES.

The high voltage wiring consists of interconnecting the ionizing-collecting cells into banks with bus bars, then wiring each bank of interconnected cells to its corresponding power supply with the high voltage cable.

NOTE: IT IS IMPORTANT TO WIRE EACH BANK OF CELLS TO ITS CORRESPONDING POWER SUPPLY AS EACH POWER SUPPLY IS MARKED WITH A SPECIFIC OPERATING RANGE AND SIZED FOR A GIVEN BANK OF CELLS.

Refer to Figure 6A or 6B, and select the appropriate unit model. Interconnect the cells with the bus bars as shown. When fully connected, the cells will be grouped into banks as indicated by the letters “A” and “B”.
Next, wire the interconnected cell banks to their corresponding power supplies with the high voltage cable provided. Depending on the size of the unit, there may be from 3 to 14 PWM Power Supplies.

NOTE: Each high voltage cable should be run in a separate conduit and must not be spliced at any point between the power supply and the cell termination.

Use the blue cable for the ionizer and the black cable for the collector plates. At the cell termination, the outer jacket of insulation should carefully be stripped back from the inner layer of insulation a distance of four (4) inches to prevent tracking.
Normally the high voltage cable entrance should be made from the top of the ductwork. If the installation demands entrance from some other point, the conduit should be sealed where it terminated at the duct to prevent moisture from entering the conduit during the washing operation.
At the power pack termination, be sure the blue ionizer cable is connected to the terminal marked IONIZER and the black collector cable is connected to the terminal marked COLLECTOR.

B. *Primary Wiring*

(1.) Duct Door Electrical Interlocks
(Two are furnished as standard) - Outside each duct access door.

(2.) Duct Door Electrical Interlock and Pilot Lights
(Two are furnished as standard) – Outside each duct access door and adjacent to the electrical interlocks.

(3.) Duct Lights
(Two are furnished as standard) – On air entering side and on air leaving side of air cleaner on the inside of the ductwork.

(4.) Disconnect Switch and Pilot Lights
(Four are furnished as standard) – Two on Inside, Two on Outside of each access door at most

convenient location near the door. Those located inside are wired in series with the electrical interlocks and used as a safety measure to control the primary power to the high voltage power supplies from inside the duct. Those located outside control the duct lights.

Grounding

An earth ground must be provided to the Model 60 cabinet and control. All ground connections must be in contact with bare metal and securely affixed. Ground conductor size and connection means will be in accordance with all applicable electrical code standards.

9. Check Out for System Start-up

When the installation has been completed, assure that the equipment is ready for start-up by checking the following:

A. Ensure all construction debris is removed from the ionizing-collecting cells, drain basin and ductwork.
B. The drain line from the Trion drain basin is clear and completely connected to its point of termination.
C. Supply line power is available and electrical wiring is completed to the following components:

   1. Controller
   2. Electrical Interlocks
   3. Ionizing-Collecting Cells
   4. The System Fan
   5. Duct Lights, Indicating Lights and Switches

SECTION III OPERATION & SERVICE

WARNING
RISK OF ELECTRIC SHOCK
These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

FOR THE MAINTENANCE ENGINEER

1. Introduction and Principle of Operation

The Trion® electronic air cleaner is technically known as an electrostatic precipitator. In this type of equipment, all airborne particles, even of microscopic size, are electrically charged (positively) as they pass through a high voltage ionizer. These charged particles are then attracted and adhere to a series of parallel collecting plates, which form the negative elements of an electrostatic field.

The ionizer consists of charged stainless steel spiked blades spaced between grounded electrodes. The collecting section consists of parallel plates arranged so that each alternate plate is charged while the intermediate plates are electrically grounded.

Periodically, depending on the type and concentration of contamination in the air, the contaminate is washed from the plates by manually cleaning the cells while in place or removing them from the unit and then cleaning. Two major functional components comprise the air cleaner:

(1) Ionizing-collecting cells to ionize and collect airborne particulate matter.
(2) Power supply(s) to supply high voltage direct current to the ionizing-collecting cells.

Normally, systems are designed for collection efficiencies in the range of 90 percent or more. Collecting a contaminant at these efficiencies, especially when there are high concentrations can result in large accumulations in a relatively short period. Therefore, maintenance must encompass two areas; the operation of the equipment for efficient collection and the systematic removal of the collected contaminant.

2. General Description

The ionizing-collecting cells (contaminant collecting elements) are housed in the cabinet on unistrut frames. They can be removed from the unit as required, from the backside (downstream airflow side). When installing cells into the cabinet, observe the directional arrows on the cell end plates. The side of the cell containing the spiked ionizer blades always must be located on the air entering side.

The Power Supply(s) convert the 115 volt, 60HZ, single phase AC supply to the high voltage DC needed to power the ionizing-collecting cells. Potential of 13 KVDC are required for the ionizer sections and 6.5 KVDC for the collector sections of the cells.

3. Initial Start-up

A. Inspect the inside of the adjoining ductwork and Trion cabinet to be sure it is clean and free of any debris or construction materials. Especially note the opening in the drain basin for any restrictions. The ducting, where secured to the cabinet collars, should be sealed water tight either with gasketing or caulking.

B. Inspect the ionizing-collecting cells to see that all of the ionizing blades or wires are intact, that no large pieces of foreign material are lodged between the plates, and that the cells are properly installed in the cabinet with the spiked ionizing blades or wires located on the air entering side.

C. Check the high voltage leads to see that they are connected to the proper terminal both at the

ionizing-collecting cells and inside the controller. Refer to Figure 14A.

D. Be sure that the drain lines from the Trion cabinet drain basin are completely connected and properly terminated. A trap or seal of some type should be incorporated in the line to prevent air bypass.

E. Be sure that electrical power is available, that the wiring is completed, and that the system blower is ready to energize.

F. Be sure that all access door interlocks are closed.

G. Close the system electrical supply switches, making power available to the Trion controller and the system fan.

H. Turn the controller selector switch to the "ON" position. The blower should run (if installed) and the power supply(s) should be energized. Electrical arcing within the ionizing-collecting cells may occur. It is a normal occurrence caused by accumulation of dusts from construction or other sources in the cell(s) and should subside quickly. If the arcing is continuous and does not subside, recheck the routing of the high voltage leads between the power supply(s) and the cell(s). Refer to the field-wiring diagram. The ionizer lead must be connected to the ionizer and the collector lead to the collector.

4. Routine Maintenance

A. *Washing Frequency*
The frequency that the collected dirt is to be washed from the unit depends upon the type and amount of dirt in the air to be cleaned. Dirt, which is greasy in nature, tends to harden after collection and should be washed away often. Likewise, units operating under extremely heavy dirt loads should be washed more often as a large build-up of collected material will have a tendency to "blow-off" if permitted to remain on the collecting elements for long periods of time. In that the type and amount of dirt varies geographically (and from one location to another in any given area) it is recommended to start operation with a washing frequency of at least once a month. This schedule may then be altered as needed after visual examinations of the collected material contained on the ionizing-collecting cells.

B. *Detergent*
Effective washing is dependent upon detergent. The detergent, as supplied by Trion, Inc., is formulated specifically for electronic air cleaners. If substitutes are used, they must be approved by Trion, so as to not void the warranty. They should be safe for use in ventilation systems and non-caustic, as 95% of the ionizing-collecting cells are constructed of aluminum, special high voltage insulation and gasket seals.

C. *Electrical Operation*
The Air Boss controller (Optional) contains a digital LED display for kilovolt and milliampere readings. The milliammeter should be observed on a routine basis to be sure that it is reading within the prescribed operating range as marked on the data plate. For those units containing a voltmeter, the collector voltage should be between 6 and 7 KV, and the ionizer between 12.5 and 13.5 KV.

The ATS controller and remote PWM box both have LED indicating lights to show power to the PWM power supplies. Flickering or failed LED's indicate electrical arcing and/or power failure.

5. Periodic Maintenance

A. Controller - ***Every 12 Months***
The inside of the controller cabinet should be examined for accumulated dirt and dust. If required, the components should be cleaned using a good brand of electrical contact cleaner. All terminal connections should be checked for securement and tightened or reworked as required.

B. Ionizing-Collecting Cell – ***Every 6 to 12 Months***
Remove and inspect the ionizing-collecting cells for excessive dirt accumulations. Manually clean as required in a soak tank, commercial car wash, or with a pressure hose or pressure cleaner using a low-pressure setting. At this time, particular care should be taken in cleaning each of the insulators.

WARNING:
DO NOT USE HIGH PRESSURE STEAM CLEANING EQUIPMENT TO CLEAN CELLS. THE EXCESSIVE HEAT AND PRESSURE WILL CAUSE THE PLATES TO WARP AND IN TURN POSSIBLY CAUSE EXCESSIVE ARCING.

C. *Filter Devices –* ***Every 4 to 6 Months***
Hoods, impingers, metal mesh filters, ducts and other appurtenances shall be cleaned to bare metal at frequent intervals prior to surfaces becoming heavily contaminated with grease, oil or other contaminate. It may be advantageous to clean readily removable items, such as impingers, metal mesh filters or other permanent filter devices in a soak tank, with a pressure hose or pressure cleaner low setting. After cleaning to bare metal, components shall not be coated with powder or other substance.

When a cleaning service is used, a certificate showing dates of inspection and/or cleaning shall be maintained on the premises.

WARNING
Flammable solvents or other flammable cleaning aids shall not be used.

At the start of the cleaning process, electrical switches that could be accidentally activated shall be locked out. Components of the fire suppression system (if installed) shall not be rendered inoperable during the cleaning process.

Care should be taken not to apply cleaning chemicals on any fusible links or other detection devices of the automatic extinguishing system.

6. Troubleshooting

WARNING:
EXERCISE THE USUAL PRECAUTIONS WHEN WORKING WITH HIGH VOLTAGE. THE MAXIMUM OPERATING OUTPUT FROM THE POWER SUPPLY IS 15,000 VDC AND 5.5 MA. to 11.0 MA. WHEN IN PARALLEL.

IF SAFETY SWITCHES ARE CLOSED AND CIRCUIT IS ENERGIZED, DO NOT TOUCH HIGH VOLTAGE. WHEN THE CIRCUIT IS DE-ENERGIZED, ALWAYS BLEED OFF REMAINING STATIC CHARGE WITH AN INSULATED HANDLED SCREW DRIVER BY SHORTING to GROUND THE POINTS OF HIGH VOLTAGE DC POTENTIAL.

WARNING
Risk of Electrical Shock

The servicing Instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the service instructions unless you are qualified to do so.

A. Introduction

This section on troubleshooting provides a description of potential malfunctions, their cause, location and correction. A Trouble Reference Chart listing the most probable causes and corrections follows the general text.

The electronic air cleaner is the unit within the system that has the highest efficiency collection rating and is also the one with the highest potential for malfunction. When a malfunction does occur, the outage is usually found in the electrical secondary circuit in the ionizing-collecting cell(s).

Indicating lights are installed in the face panel of the control to monitor the electrical operation of each power supply and the ionizing-collecting cell(s) they energize. The quantity of power supplies per unit is dependent upon unit size with one or two power supplies for each ionizing-collecting cell tier in height. Other than the basic hand tools, it is advantageous to have a volt/ohm/milliammeter with a 20 KVDC high voltage probe. These instruments are standard catalog items by several manufactures.

B. Secondary Short Circuit

The most common outage is a short in the secondary circuit and is best located through the process of elimination. Symptoms are a flickering indicating light accompanied by an arcing noise in the ionizing-collecting cell(s) or an indicating light that is not glowing.

A flickering light with an arcing noise is an indication of a high resistance short circuit and a light that is not glowing is an indication of a dead short. (A light that is not glowing can also be an indication of an open circuit in the primary circuit. Refer to the paragraph on open circuits.) The short may be in the power supply, the high voltage cables or the ionizing-collecting cell(s). To isolate the short to any one of these three components, proceed as follows:

WARNING

When safety interlock switches are closed, do not come in contact with high voltage components. The operating output from the high voltage power supply(s) is 12,600 VDC and 6 MA. to 11.0 MA.

When the power supply(s) is de-energized there Is a 20 second delay for the voltage to decay. Always short from ground to a point of high voltage with a well Insulated jumper wire or an insulated handled screwdriver to bleed-off any remaining residual charge.

1. Disconnect both high voltage leads from their respective terminals in the power supply and support them away from any point of contact.

2. Energize the power supply:

   a. If the light still flickers or does not glow, the trouble is indicated to be in the power supply. First, check the inline fuse mounted on the circuit board and replace if it is blown. Second, replace the power supply in its entirety.

   b. If the light glows steady with the leads disconnected the power supply is indicated to be normal.

NOTE: It will be necessary to close the access door electrical interlock switch operated by the access door, to complete the primary circuit to the power supply.

3.Next reconnect both high voltage leads to their respective terminals inside the power supply and disconnect them at the ionizing-collecting cell(s). Support them away from any point of contact and energize the power supply.

a. If either high voltage lead is defective the light will indicate the trouble. Each lead may then be checked

separately by disconnecting them, one at a time, from their respective terminals at the power supply. When a lead is found to be defective, replace it in its entirety. Do not repair or splice.

b. If the light glows steady with the leads disconnected at the ionizing-collecting cell(s) the trouble is then indicated to be in the ionizing-collecting cell(s).

The trouble can then be isolated to a single cell, or the ionizing or collector section of a given cell as follows:

(1) First determine if the short is in the ionizing section or the collecting section by connecting each high voltage lead to its respective section, one at a time, and energizing the power pack. (The lead not connected must be supported away from any point of contact.) The short symptoms will still exist for the section in which the short is located. If the trouble causing the short is bridging both sections, then the short will be indicated in both sections when they are individually connected.

(2) When the short is isolated to a cell tier, remove all the cells within the tier and visually check the sections indicated to contain the short.
(a). If the short is in the ionizer section, look for a broken or defective insulator.
(b). If the short is in the collector section, look for a large piece of foreign material bridging the collector plates or a defective insulator.
(c). If the short is indicated to be in both sections, it will probably be a foreign object bridging the air gap between the ionizer and the collector.

c. Open Circuits

Although open circuits can occur in the secondary they usually take place in the primary. If the unit contains only one power supply and the indicating light does not glow the outage is probably one of the following.
(1) Supply line power to the control disconnected. Reconnect.
(2) Open access door interlock in control of electronic air cleaner. Be sure all access doors are properly closed and secured.
(3) Blown in-line fuse- Replace Power Supply.
(4) Outage in the power supply. Look for charred or burned components or a loose wiring connection. Replace power supply or reconnect wiring.
(5) Defective indicating light. Replace light.

d. Malfunctions other than short or open circuits. Refer to troubleshooting reference chart in this section.

7. Spare Parts

Recommended spare part quantities are usually based on the unit size and the amount of units per installation. For specific recommendations, consult the Trion factory or nearest Sales Office. Consideration, however, should be given to stocking the following components;

DESCRIPTION	QTY.
PWM Power Supply	2
Cell Insulators	6
LED	2

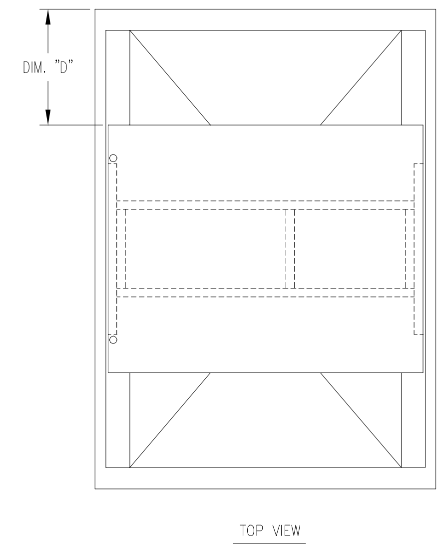
Part Numbers are not listed as they are subject to change. Always state Unit Model and Serial Numbers when ordering parts.

Troubleshooting Reference Chart

PROBLEM/ SYMPTOM	PROBABLE CAUSE	LOCATION	REASON - CORRECTION
Indicating Light Not Glowing	Short Circuit	Ionizing Section of Cell	1. Dirty insulator(s) – Clean 2. Defective insulator(s) – Replace 3. Foreign Object Between Ionizing Bar and Ground electrode - Remove
		Collecting Section of Cell	1. Dirty insulator(s) - Clean 2. Defective insulator(s) – Replace 3. Foreign Material Bridging Plates - Remove 4. Bent Plates – Straighten or Replace
		High Voltage Leads	1. Disconnected High Voltage Lead Contacting Ground - Reconnect 2. Defective Lead/Insulation Breakdown – Replace Entire Lead
		Power Supply	Charred/Over Heated Components – Replace Power Supply
Indicating Light Not Glowing	Open Circuit	Control	1. Disconnected Supply Line Power – Reconnect 2. Faulty indicting Light - Replace
		Power Supply	1. Blown Fuse – Replace Power Supply 2. Disconnected Wire – Replace 3. Charred/Over Heated Components – Replace Power Supply
		Electronic Air Cleaner Housing	1. Electrical Interlock Switch Not Closed – Close Access Door 2. Faulty Electrical Interlock Switch - Replace
Indicating Light Flickering	High Resistance Short	High Voltage Circuit	1. Ionizer High Voltage Lead Connected to Plate Section and Plate Lead to Ionizer – Reconnect Leads 2. Loose or Disconnected High Voltage Lead-Tighten or Reconnect 3. Loose or Defective Intercell Connection (on Multicell Units) – Tighten or Replace 4. Foreign Object Adrift in Ionizer or Plate Section of Cell - Remove

MODEL 60-XXX-01 UNIT OUTLINE SINGLE SECTION

NOTE: SEE FIGURE 1A FOR DIMENSIONS TABLE



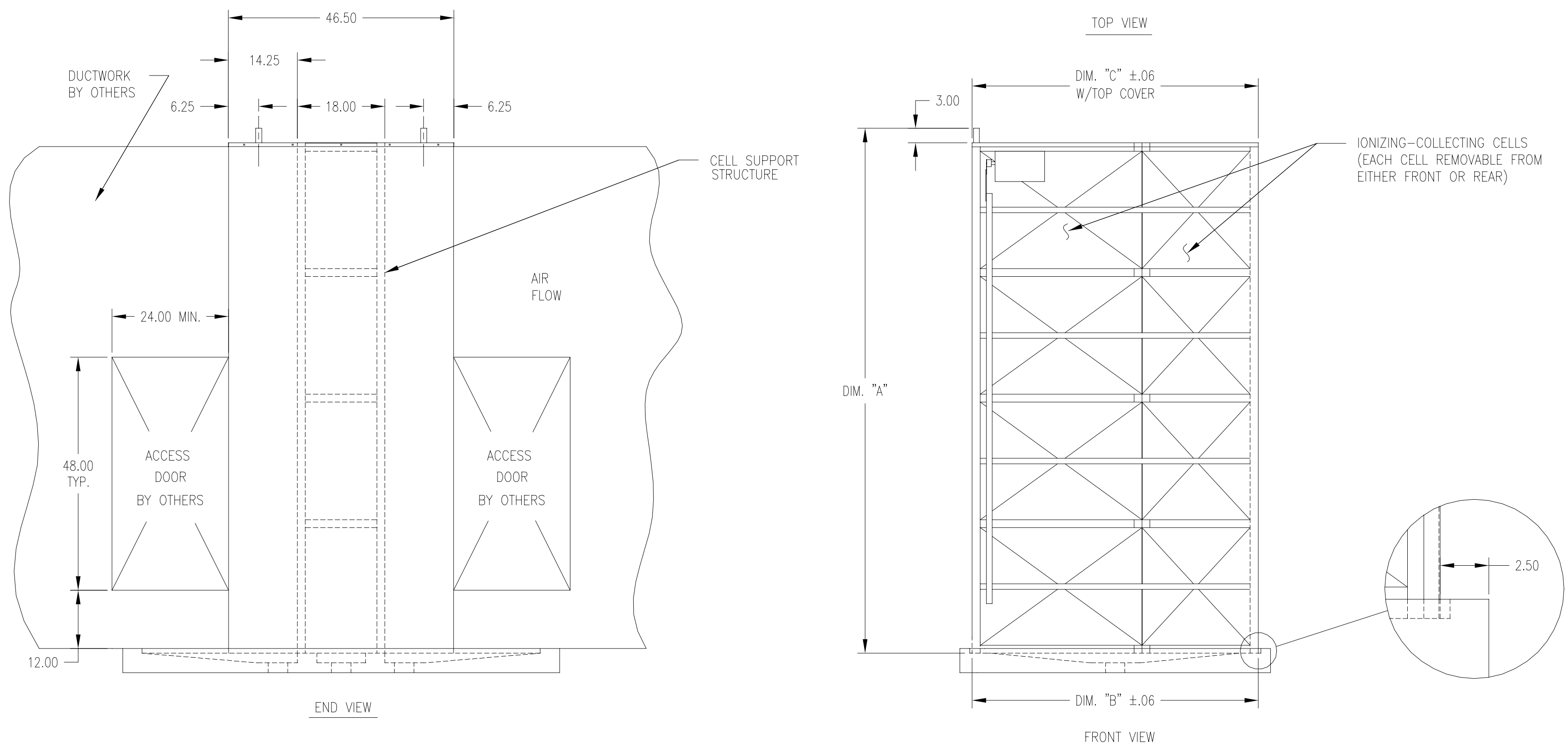


FIGURE 1

MODEL60-LF1-1

SINGLE SECTION
MODEL 60-XXX-01 UNIT OUTLINE

NOTE: SEE FIGURE 1 FOR PICTORIAL

UNIT MODEL NO.	DIM "A"	DIM "B"	DIM "C"	DIM "D"	POWER PACKS REQ'D. PER UNIT	APPROXIMATE UNIT WEIGHT
60-304-01	79.31	47.81	47.94	21.75	1	995 LBS.
60-305-01	79.31	59.00	59.12	21.75	1	1135 LBS.
60-306-01	79.31	70.19	70.31	21.75	1	1275 LBS.
60-307-01	79.31	81.03	81.16	21.75	2	1435 LBS.
60-308-01	79.31	92.21	92.34	21.75	2	1575 LBS.
60-309-01	79.31	103.40	103.53	21.75	2	1715 LBS.
60-403-01	105.19	36.88	37.00	21.75	1	1070 LBS.
60-404-01	105.19	47.81	47.94	21.75	1	1275 LBS.
60-405-01	105.19	59.00	59.12	21.75	2	1460 LBS.
60-406-01	105.19	70.19	70.31	21.75	2	1640 LBS.
60-407-01	105.19	81.03	81.16	21.75	2	1845 LBS.
60-408-01	105.19	92.21	92.34	21.75	2	2025 LBS.
60-409-01	105.19	103.40	103.53	21.75	2	2205 LBS.
60-504-01	131.06	47.81	47.94	21.75	2	1555 LBS.
60-505-01	131.06	59.00	59.12	21.75	2	1780 LBS.
60-506-01	131.06	70.19	70.31	21.75	2	2000 LBS.
60-507-01	131.06	81.03	81.16	21.75	2	2255 LBS.
60-508-01	131.06	92.21	92.34	21.75	3	2485 LBS.
60-509-01	131.06	103.40	103.53	21.75	3	2705 LBS.
60-604-01	156.94	47.81	47.94	33.75	2	1775 LBS.
60-605-01	156.94	59.00	59.12	33.75	2	2040 LBS.
60-606-01	156.94	70.19	70.31	33.75	2	2310 LBS.
60-607-01	156.94	81.03	81.16	33.75	3	2610 LBS.
60-608-01	156.94	92.21	92.34	33.75	3	2875 LBS.
60-609-01	156.94	103.40	103.53	33.75	3	3140 LBS.
60-704-01	182.81	47.81	47.94	33.75	2	2060 LBS.
60-705-01	182.81	59.00	59.12	33.75	2	2365 LBS.
60-706-01	182.81	70.19	70.31	33.75	3	2675 LBS.
60-707-01	182.81	81.03	81.16	33.75	3	3025 LBS.
60-708-01	182.81	92.21	92.34	33.75	4	3335 LBS.
60-709-01	182.81	103.40	103.53	33.75	4	3638 LBS.

NOTES:

1. MODEL DESIGNATION DETERMINED AS FOLLOWS:

   60-X XX-01
   - EQUIPMENT TYPE (FIELD ASSY.) — 60
   - NO. OF CELLS IN HEIGHT — X
   - NOMINAL UNIT WIDTH IN FT. — XX
   - SPECIAL FEATURES — 01

   EXAMPLE: UNIT SHOWN IS MODEL 60-405-01

   EQUIPMENT TYPE: MODEL 60 (FIELD ASS'Y)
   NO. OF CELLS IN HEIGHT: 4
   NOMINAL UNIT WIDTH: 5 FT (ONE 2 FT. & ONE 3 FT. CELL)
   FEATURE 01: NO WASH

2. SPECIFY UNIT HAND, EITHER RIGHT OR LEFT. UNIT HAND DETERMINES THE SIDE OF THE UNIT (IN DIRECTION OF AIR FLOW) FOR CONNECTON OF WASH MANIFOLD HEADERS AND MANIFOLD DRIVE MOTORS. (LEFT HAND UNIT SHOWN)

3. TWO STANDARD CELL SIZES, 2 FT & 3 FT NOMINAL– EACH CELL AT SAME HEIGHT. STANDARD UNITS EQUIPPED WITH MAXIMUM NUMBER OF 3 FT. CELLS FOR EACH NOMINAL UNIT WIDTH.

   EXAMPLE: STANDARD MODEL 60-408-01 HAS A NOMINAL UNIT WIDTH OF 8 FT.– ONE 2 FT. CELL & TWO 3 FT. CELLS (NOT, FOUR 2 FT. CELLS).

FIGURE 1A

MODEL60-LF1-2

DESCRIPTION OF PARTS SHOWN

1 BASE FRAME
2 LEFT END FRAME UPRIGHT
3 RIGHT END FRAME UPRIGHT
4 TOP FRAME
5 INTERMEDIATE CELL SUPPORTS
6 RETAINING ANGLES, INTERMEDIATE SUPPORT
7 MANIFOLD DRIVE MOTOR ASSEMBLY
8 HEADER SUPPORT
9 MANIFOLD HEADER
10 MANIFOLD END SUPPORT
11 MANIFOLD END BUSHINGS
12 WASH MANIFOLDS
13 TOP CONNECTING LINK
14 MAIN DRIVE LINK
15 IONIZING COLLECTING CELL - 2 Ft.
16 IONIZING-COLLECTING CELL - 3 Ft

EXPLODED VIEW
SINGLE-SECTION UNIT
MODEL 60-307-00
LEFT HAND
ARRANGEMENT

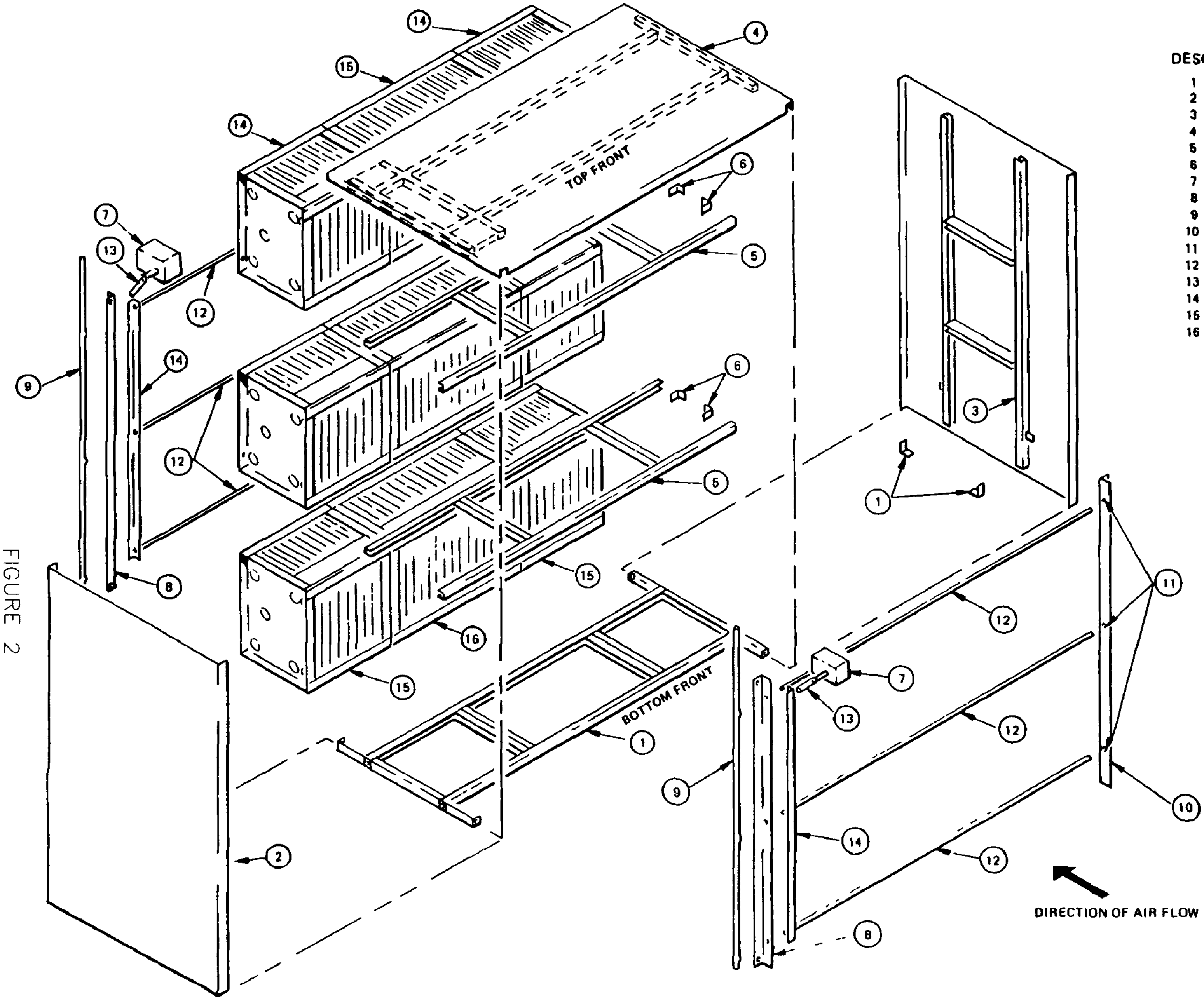
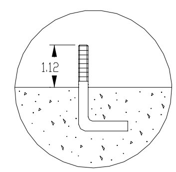


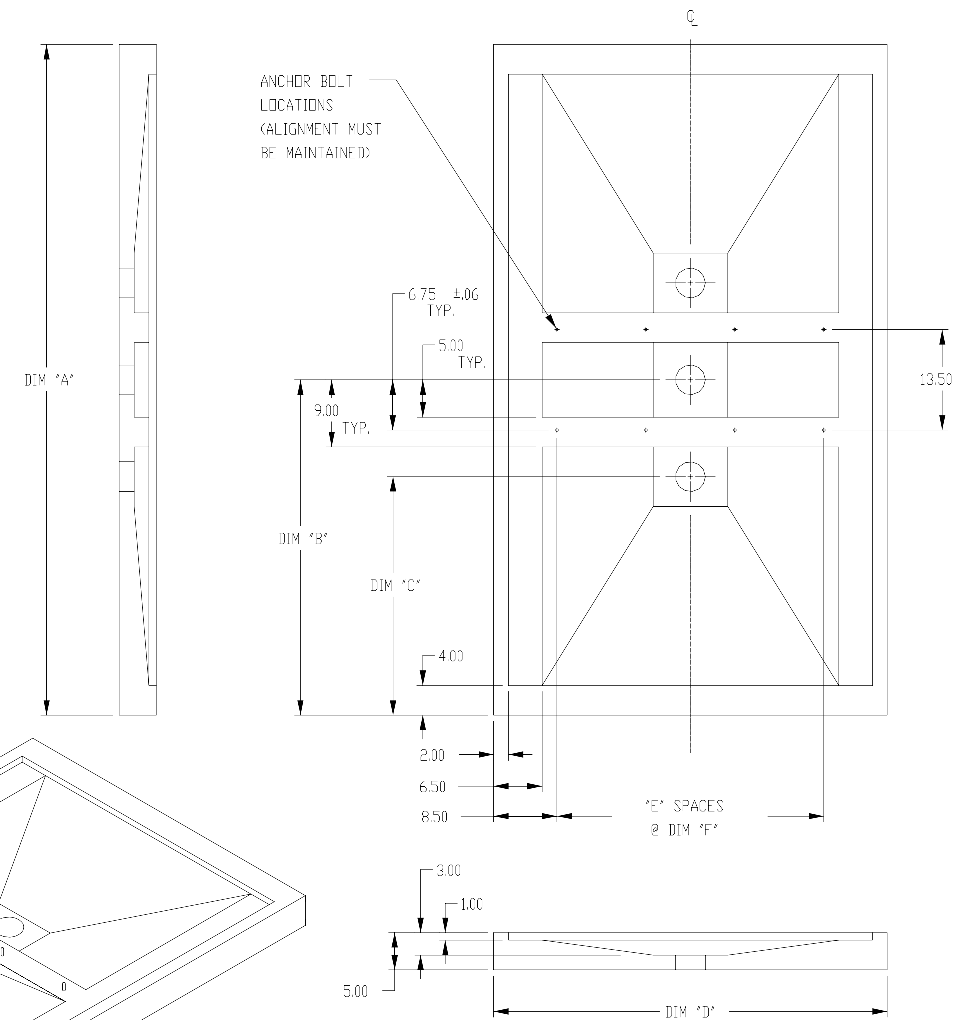
FIGURE 2

MODEL60-LF2

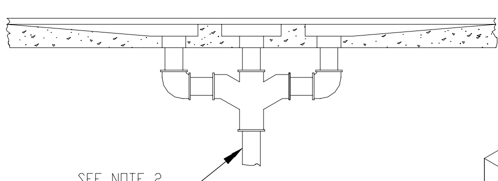
UNIT MODEL NO.	DIM "A"	DIM "B"	DIM "C"	DIM "D"	"E" SPACES	DIM "F"	ANCHOR BOLTS REQ'D.	WATER DRAINAGE
60-304-00	90.00	45.00	32.00	52.81	3	11.937	8	25 GPM
60-305-00	90.00	45.00	32.00	64.00		15.667		29 GPM
60-306-00	90.00	45.00	32.00	75.18		19.393		36 GPM
60-307-00	90.00	45.00	32.00	86.03		23.010		40 GPM
60-308-00	90.00	45.00	32.00	97.22		26.740		47 GPM
60-309-00	90.00	45.00	32.00	108.40	4	22.850	10	50 GPM
60-403-00	90.00	45.00	32.00	41.87	2	12.435	6	24 GPM
60-404-00	90.00	45.00	32.00	52.81	3	11.937	8	34 GPM
60-405-00	90.00	45.00	32.00	64.00		15.667		38 GPM
60-406-00	90.00	45.00	32.00	75.18		19.393		48 GPM
60-407-00	90.00	45.00	32.00	86.03		23.010		53 GPM
60-408-00	90.00	45.00	32.00	97.22		26.740		62 GPM
60-409-00	90.00	45.00	32.00	108.40	4	22.850	10	67 GPM
60-504-00	90.00	45.00	32.00	52.81	3	11.937	8	42 GPM
60-505-00	90.00	45.00	32.00	64.00		15.667		48 GPM
60-506-00	90.00	45.00	32.00	75.18		19.393		60 GPM
60-507-00	90.00	45.00	32.00	86.03		23.010		66 GPM
60-508-00	90.00	45.00	32.00	97.22		26.740		78 GPM
60-509-00	90.00	45.00	32.00	108.40	4	22.850	10	84 GPM
60-604-00	114.00	57.00	44.00	52.81	3	11.937	8	50 GPM
60-605-00	114.00	57.00	44.00	64.00		15.667		58 GPM
60-606-00	114.00	57.00	44.00	75.18		19.393		72 GPM
60-607-00	114.00	57.00	44.00	86.03		23.010		79 GPM
60-608-00	114.00	57.00	44.00	97.22		26.740		94 GPM
60-609-00	114.00	57.00	44.00	108.40	4	22.850	10	101 GPM
60-704-00	114.00	57.00	44.00	52.81	3	11.937	8	59 GPM
60-705-00	114.00	57.00	44.00	64.00		15.667		67 GPM
60-706-00	114.00	57.00	44.00	75.18		19.393		84 GPM
60-707-00	114.00	57.00	44.00	86.03		23.010		92 GPM
60-708-00	114.00	57.00	44.00	97.22		26.740		109 GPM
60-709-00	114.00	57.00	44.00	108.40	4	22.850	10	118 GPM



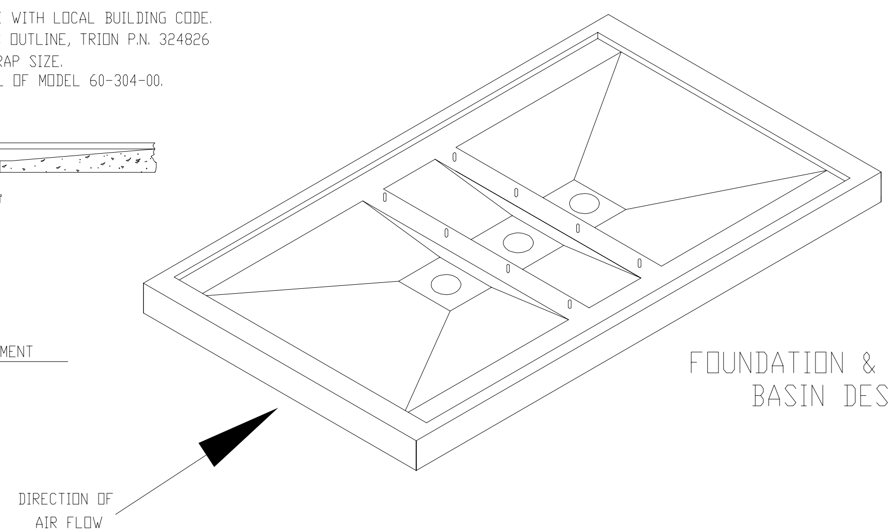
TYPICAL ANCHOR BOLT
3/8" - 16 NC



NOTES:
1. PLUMB DRAIN IN ACCORDANCE WITH LOCAL BUILDING CODE.
2. REFER TO PIPING SCHEMATIC OUTLINE, TRION P.N. 324826 FOR MINIMUM DRAIN-LINE TRAP SIZE.
3. DRAIN BASIN SHOWN TYPICAL OF MODEL 60-304-00.



TYPICAL DRAIN PIPING ARRANGEMENT



FOUNDATION & DRAIN
BASIN DESIGN

TABLE 2				
UNIT (SECTION) MODEL NO.	WATER REQ'D. PER SECTION @ 40 PSI	WATER REQ'D. PER CYCLE PER SECTION	DETERGENT REQ'D. PER CYCLE PER SECTION	PIPING COMPONENT SIZE (SEE NOTE 8 & 9)
60-304-00	25 GPM	75 GALS.	1.2 GPM	1.25
60-305-00	29 GPM	87 GALS.	1.4 GPM	1.25
60-306-00	36 GPM	108 GALS.	1.7 GPM	1.25
60-307-00	40 GPM	120 GALS.	1.9 GPM	1.25
60-308-00	47 GPM	141 GALS.	2.3 GPM	1.50
60-309-00	50 GPM	150 GALS.	2.4 GPM	1.50
60-403-00	24 GPM	72 GALS.	1.1 GPM	1.25
60-404-00	34 GPM	102 GALS.	1.6 GPM	1.25
60-405-00	38 GPM	114 GALS.	1.8 GPM	1.25
60-406-00	48 GPM	144 GALS	2.3 GPM	1.50
60-407-00	53 GPM	159 GALS.	2.5 GPM	1.50
60-408-00	62 GPM	186 GALS.	3.0 GPM	1.50
60-409-00	67 GPM	201 GALS.	3.2 GPM	1.50
60-504-00	42 GPM	126 GALS.	2.0 GPM	1.50
60-505-00	48 GPM	144 GALS.	2.3 GPM	1.50
60-506-00	60 GPM	180 GALS.	2.9 GPM	1.50
60-507-00	66 GPM	198 GALS.	3.1 GPM	1.50
60-508-00	78 GPM	234 GALS.	3.7 GPM	1.50
60-509-00	84 GPM	252 GALS.	4.0 GPM	2.00
60-604-00	50 GPM	150 GALS.	2.4 GPM	1.50
60-605-00	58 GPM	174 GALS.	2.8 GPM	1.50
60-606-00	72 GPM	216 GALS.	3.5 GPM	1.50
60-607-00	79 GPM	237 GALS.	3.8 GPM	2.00
60-608-00	94 GPM	282 GALS.	4.5 GPM	2.00
60-609-00	101 GPM	303 GALS.	4.8 GPM	2.00
60-704-00	59 GPM	177 GALS.	2.8 GPM	1.50
60-705-00	67 GPM	201 GALS.	3.2 GPM	1.50
60-706-00	84 GPM	252 GALS.	4.0 GPM	2.00
60-707-00	92 GPM	276 GALS.	4.4 GPM	2.00
60-708-00	109 GPM	327 GALS.	5.2 GPM	2.00
60-709-00	118 GPM	354 GALS.	5.7 GPM	2.00

TABLE 1	
DETERGENT SYSTEM PUMP CHARACTERISTICS 16 GAL. / 30 GAL. / 55 GAL.	
WATER SUPPLY LINE PRESSURE (PSI)	MAXIMUM VERTICAL HEAD (FT)
45	34
50	23
55	11
60*	*

1) PUMP CAPACITY AT MAX. VERTICAL HEAD FOR 16 & 30 GAL. SYSTEM: 3.0 GPM @ 60 PSI

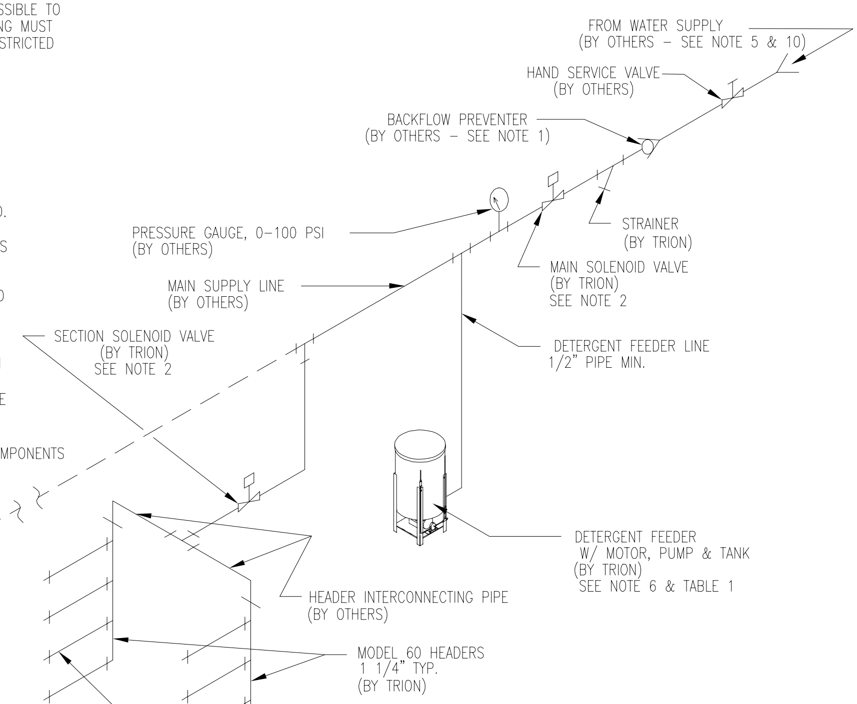
2) PUMP CAPACITY AT MAX. VERTICAL HEAD FOR 55 GAL. SYSTEM: 6.5 GPM @ 60 PSI

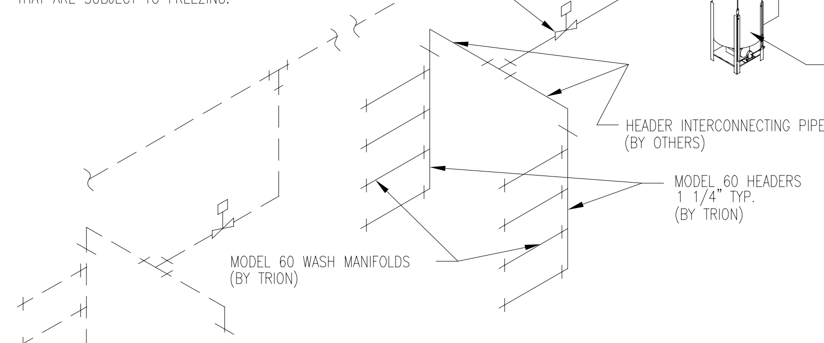
* CONTACT FACTORY FOR WATER PRESSURE'S 60 PSI AND HIGHER FOR MAXIMUM VERTICAL HEAD.

NOTES:

1) THE BACKFLOW PREVENTER MUST BE LOCATED UPSTREAM FROM THE DETERGENT FEEDER LINE CONNECTION AND "Y" STRAINER. THIS DEVICE SHOULD BE CONTINUOUS PRESSURE TYPE, AND INSTALLED IN ACCORDANCE WITH ALL APPLICABLE PLUMBING CODE REQUIREMENTS.
2) SOLENOID VALVE COIL MUST BE MOUNTED UPRIGHT.
3) TO DETERMINE TOTAL SYSTEM REQUIREMENTS PER WASH MULTIPLY BY NUMBER OF SECTIONS.
4) WATER REQUIREMENTS PER CYCLE PER SECTION BASED ON 3 MINUTE (FACTORY SET) WASH CYCLE. TO DETERMINE WATER REQUIREMENTS FOR OTHER WASH CYCLES MULTIPLY FLOW RATE (GPM) PER SECTION BY WASH CYCLE TIME (MINUTES).
5) IT IS RECOMMENDED THAT HOT WATER (MIN. 120°F) BE USED FOR A MORE EFFICIENT WASH CYCLE. HOT WATER TANKS SHOULD BE LOCATED AS CLOSE AS POSSIBLE TO THE UNIT BEING WASHED AND SUFFICIENT PIPING MUST BE PROVIDED SO THE WATER FLOW IS NOT RESTRICTED NOR WATER PRESSURE APPRECIABLY REDUCED.
6) DETERGENT QUANTITY ADJUSTABLE.
7) WATER MAIN SUPPLY LINE PRESSURE:
   45 PSI MINIMUM
   75 PSI MAXIMUM
8) DRAIN LINE TRAP MUST PROVIDE SUFFICIENT WATER COLUMN TO OVERCOME THE INTERNAL STATIC PRESSURE OF THE AIR HANDLING SYSTEM IN WHICH THE MODEL 60 IS INSTALLED.
9) ALL PIPE COMPONENTS (VALVES, PRESSURE GAUGE, BACKFLOW PREVENTER) SHOWN ON THIS DRAWING ARE TO BE LOCATED IN PROXIMITY TO MODEL 60 UNIT.
10) SIZE WATER SUPPLY LINE PIPE FOR FLOW AND PRESSURE REQUIREMENT SHOWN IN TABLE 2 AND NOTE 6. PIPING BETWEEN COMPONENTS TO MATCH PIPE COMPONENT SIZE IN TABLE 2.
11) ALL DRAIN PIPE SHOULD ALLOW FOR MAXIMUM AVAILABLE SLOPE (1/4" PER FOOT MINIMUM).
12) INJECT DETERGENT LINE INTO MAIN WATER LINE AS CLOSE AS POSSIBLE AND UPSTREAM FROM THE MODEL 60.
13) PROTECT ALL WASH WATER AND PLUMBING COMPONENTS THAT ARE SUBJECT TO FREEZING.

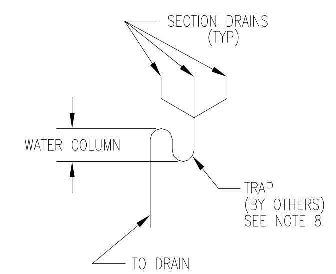
PIPING SCHEMATIC





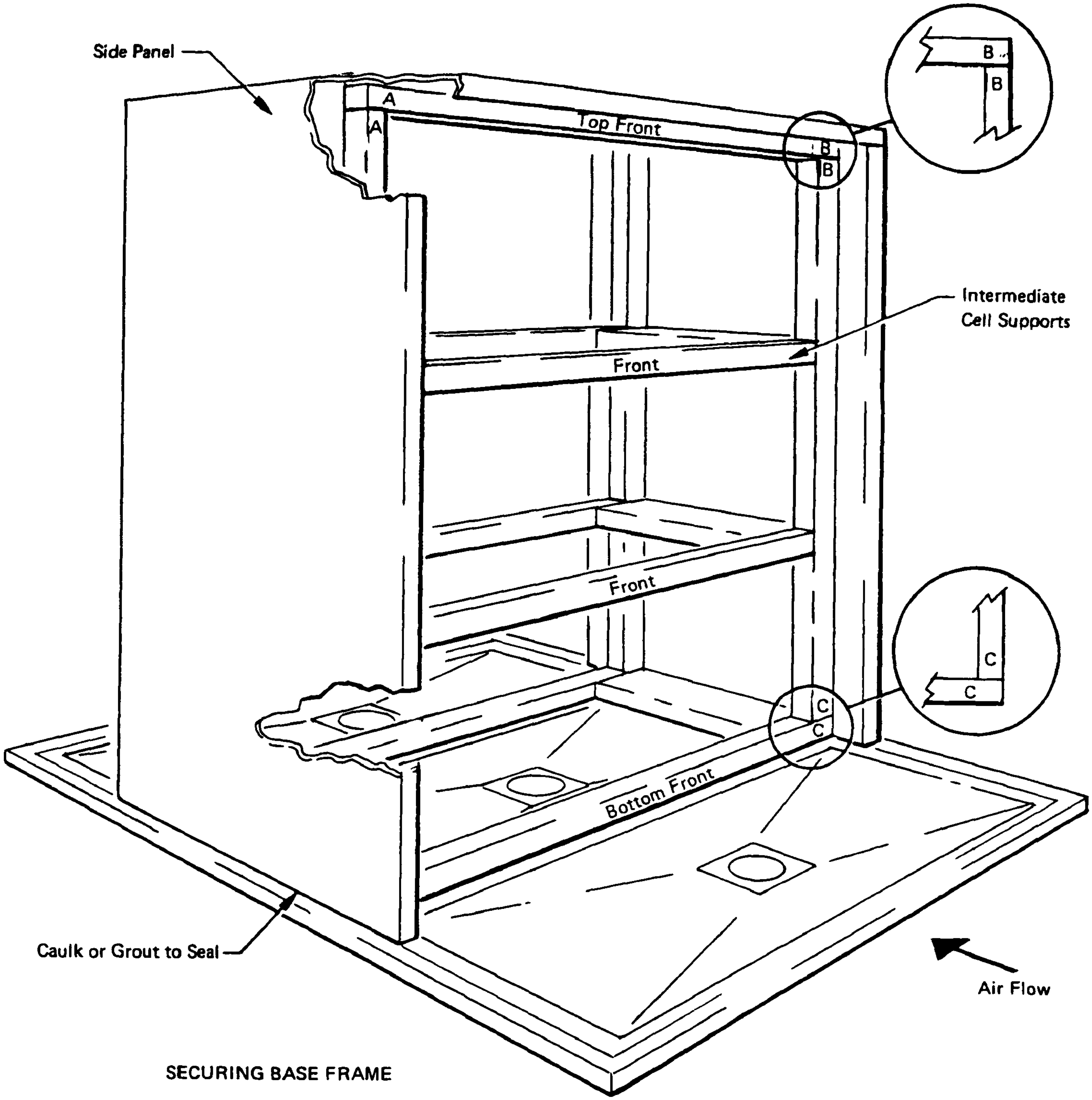
SINGLE SECTION

MULTI-SECTION

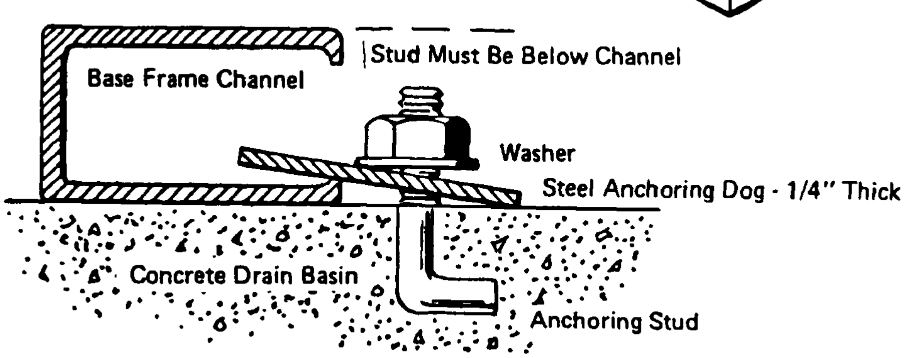


DRAIN SCHEMATIC

FIGURE 4



SECURING BASE FRAME

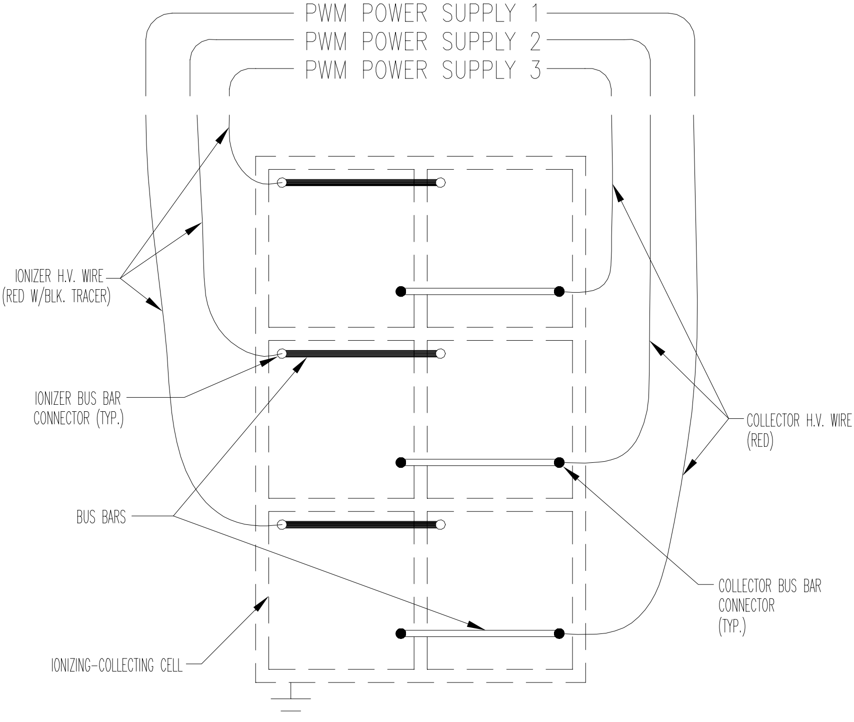


STRUCTURAL FRAMEWORK
ASSEMBLY

FIGURE 5

MODEL60-LF5

CELL ARRANGEMENT & BUS BAR CONNECTIONS MODEL 60-XXX-00 & 01



NOTES:

1) BUS BAR CONNECTIONS ARE MADE ON THE AIR LEAVING SIDE OF IONIZING-COLLECTING CELLS AS SHOWN.
2) USE SEPARATE CONDUIT FOR EACH IONIZER & COLLECTOR H.V. WIRE.
3) ALWAYS USE CONTINUOUS LENGTH OF H.V. WIRE. DO NOT SPLICE H.V. WIRE.
4) SEE FIGURE 6A & 6B FOR EACH UNIT PICTORIAL.

FIGURE 6

MODEL60-LF6-1

CELL ARRANGEMENT & BUS BAR CONNECTIONS
MODEL 60-XXX-00 & 01

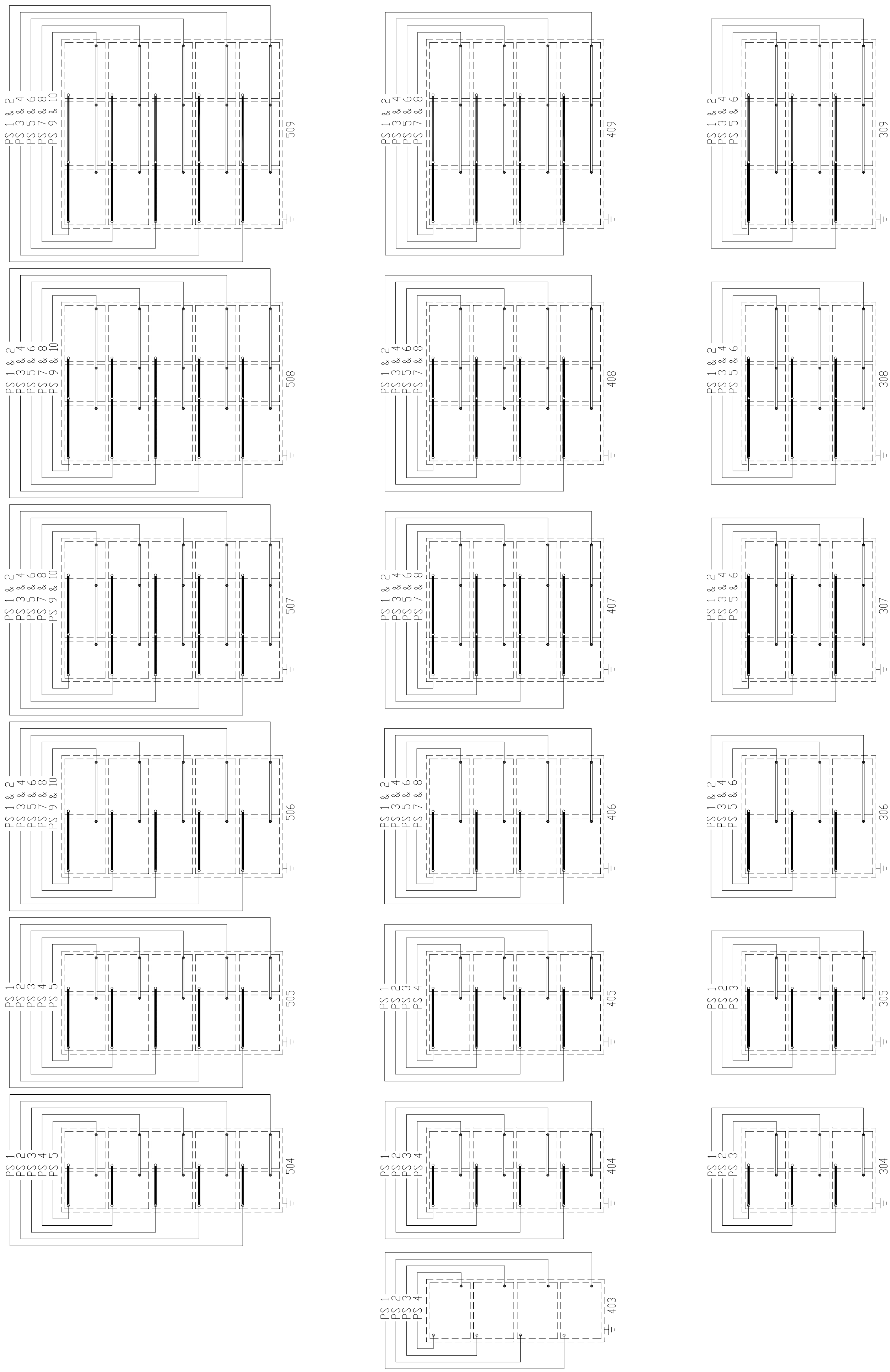


FIGURE 6A

MODEL60-LF6-2

CELL ARRANGEMENT & BUS BAR CONNECTIONS
MODEL 60-XXX-00 & 01

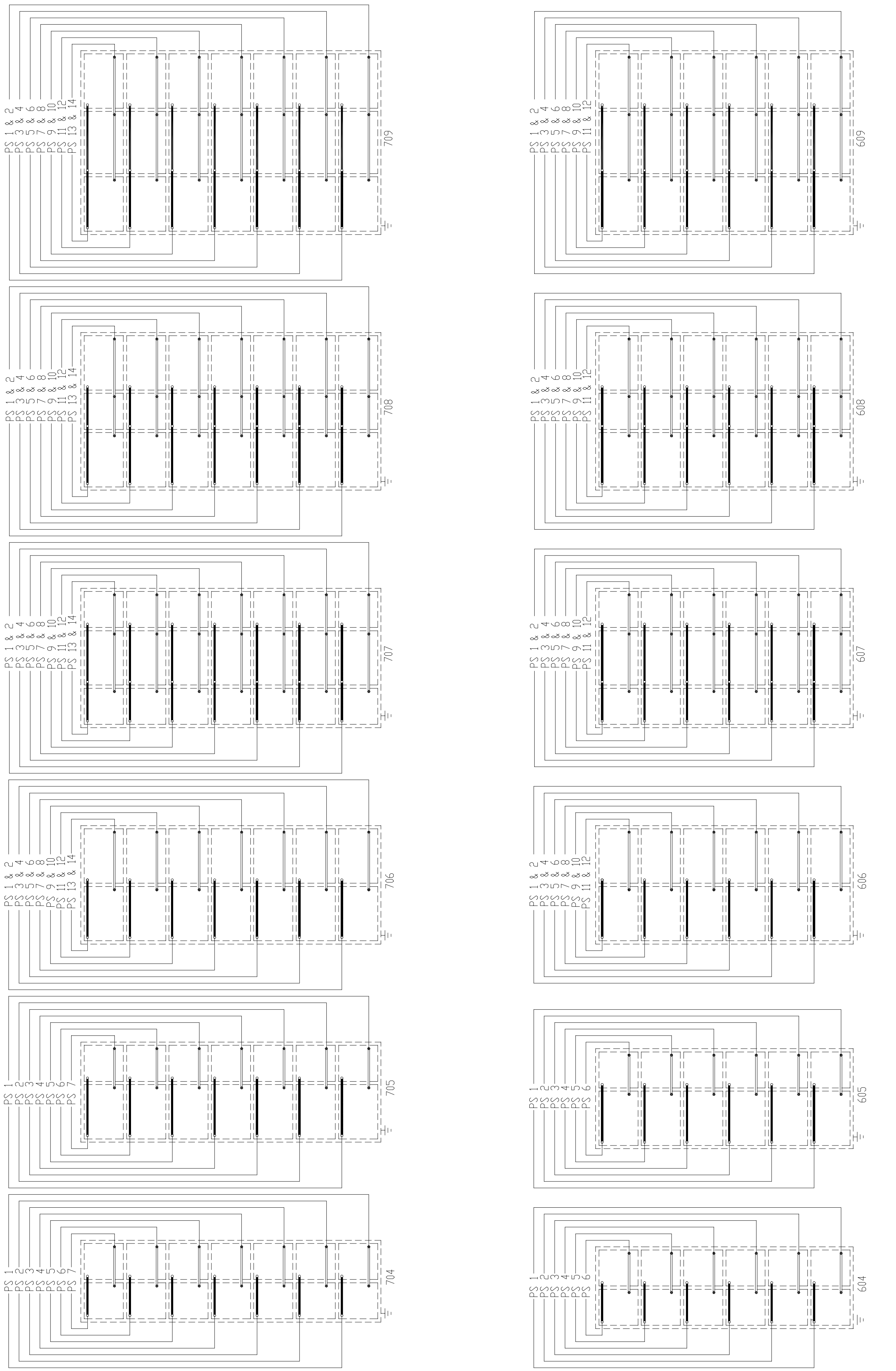
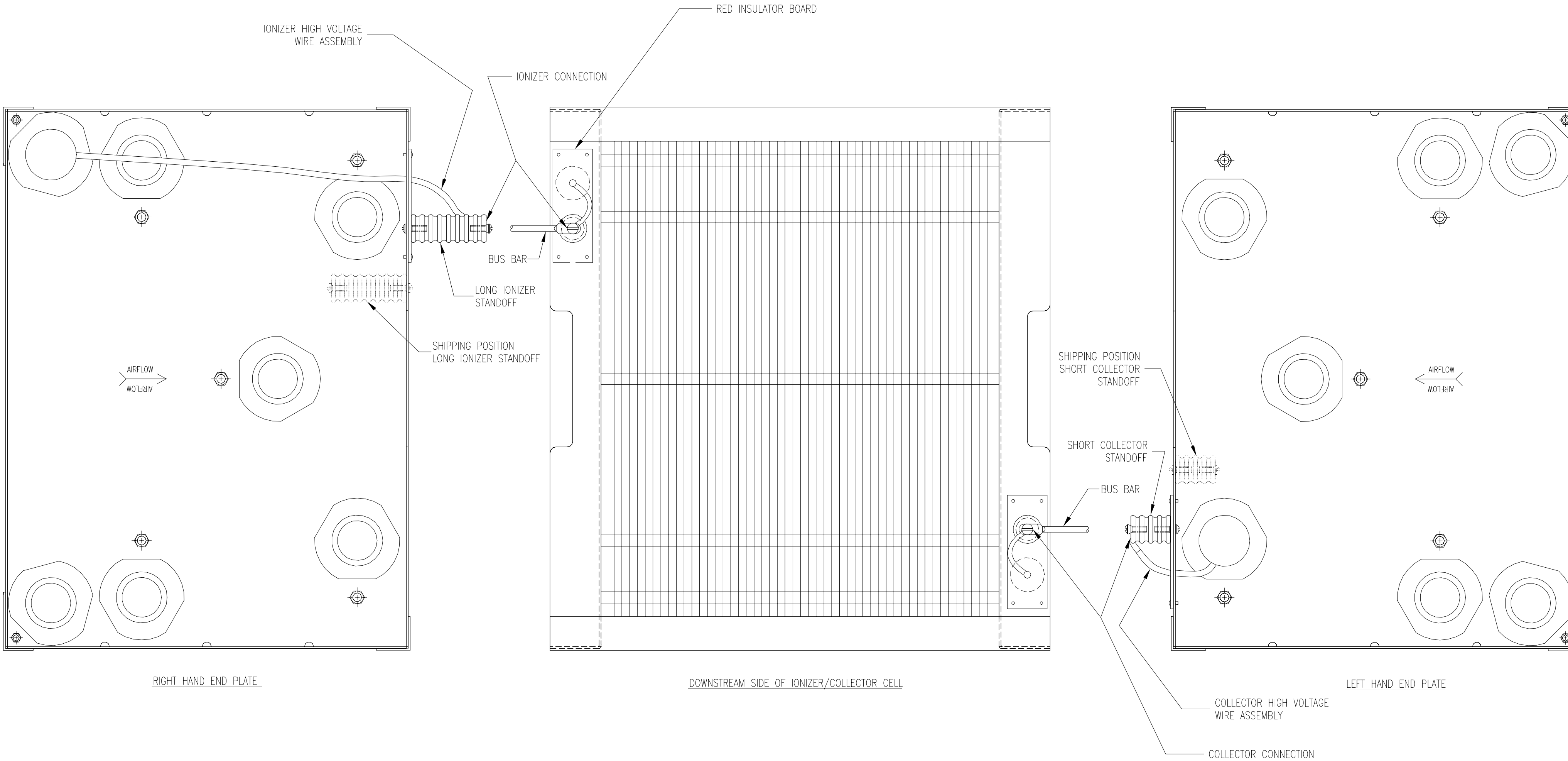


FIGURE 6B

MODEL60-LF6-3



ASSEMBLY SEQUENCE:

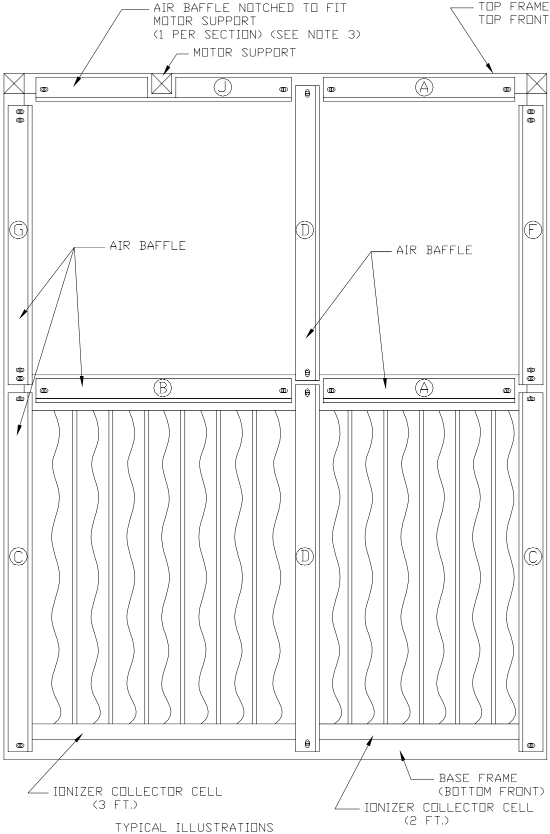
1) REMOVE CELL FROM CARTON AND LOCATE RIGHT HAND END PLATE WITH LONG IONIZER STANDOFF.
2) REMOVE LONG IONIZER STANDOFF FROM SHIPPING POSITION ON THE INSIDE SURFACE OF RIGHT HAND END PLATE AND SAVE MOUNTING HARDWARE (1/4-20 PAN HEAD SCREW & 1/4" LOCK WASHER).
3) POSITION LONG IONIZER STANDOFF OVER .312 DIAMETER MOUNTING HOLE ON THE RED INSULATOR BOARD LOCATED ON THE DOWNSTREAM FLANGE OF THE RIGHT HAND END PLATE. AFFIX STANDOFF TO RED INSULATOR BOARD WITH MOUNTING HARDWARE (1/4-20 PAN HEAD SCREW & 1/4" LOCKWASHER) SAVED FROM STEP 2.
4) REPEAT THE SEQUENCE ABOVE FOR THE SHORT COLLECTOR STANDOFF ON THE LEFT HAND END PLATE.
5) INSTALL CELLS IN MODEL 60 FRAMEWORK. NOTE THE AIR FLOW DIRECTION ON EACH CELL END PLATE. WHEN INSTALLED, THE IONIZER AND COLLECTOR STANDOFF ON EACH CELL WILL POINT IN THE DOWNSTREAM DIRECTION. (REFERENCE TRION DRAWING NO. 423081 FOR CELL ARRANGEMENT AND BUS BAR CONNECTION)
6) REMOVE THE HARDWARE (1/4-20 PAN HEAD SCREW & 1/4" LOCK WASHER) FROM THE END OF EACH SHORT COLLECTOR STANDOFF (OPPOSITE THE MOUNTING BOARD END) AND POSITION RING TERMINAL FROM THE COLLECTOR WIRE ASSEMBLY & BUS BAR(S) OVER THE THREADED HOLE IN THE END OF THE STANDOFF. POSITION LOCK WASHER UNDER THE HEAD OF THE PAN HEAD SCREW AND THREAD THE SCREW ASSEMBLY THROUGH THE BUS BAR(S) & RING TERMINAL AND INTO THE STANDOFF. DO NOT TIGHTEN ASSEMBLY DOWN UNTIL ALL HIGH VOLTAGE BUS BAR CONNECTION POINTS ARE COMPLETED ON EACH CELL.
7) REPEAT STEP 6 FOR THE CONNECTION OF THE IONIZER WIRE ASSEMBLY & BUS BAR(S) ON THE LONG IONIZER STANDOFF FOR EACH CELL.
8) TIGHTEN ALL HARDWARE ON HIGH VOLTAGE BUS BAR CONNECTION POINTS FOR EACH CELL.

MODEL 60 CELL ASSEMBLY

FIGURE 7

MODEL60-LF7

MODEL 60 AIR BAFFLE ARRANGEMENT



TYPICAL ILLUSTRATIONS

NOTES:
1. AIR BAFFLES ARE INSTALLED ONLY ON AIR ENTERING SIDE OF UNIT AS SHOWN.
2. AIR BAFFLES ARE LETTER CODED. SELECT CORRESPONDING MODEL AND FOLLOW DIAGRAM.
3. UNIT WILL BE LEFT OR RIGHT HAND AS SPECIFIED. LEFT HAND IS SHOWN. USE LETTER CODING IN SOLID CIRCLE ◯ FOR LEFT HAND UNITS. USE LETTER CODING IN BROKEN ◌ CIRCLE FOR RIGHT HAND UNITS.
4. SEE FIGURE 8A

FIGURE 8

MODEL60-LF8-1

MODEL 60 AIR BAFFLE ARRANGEMENT

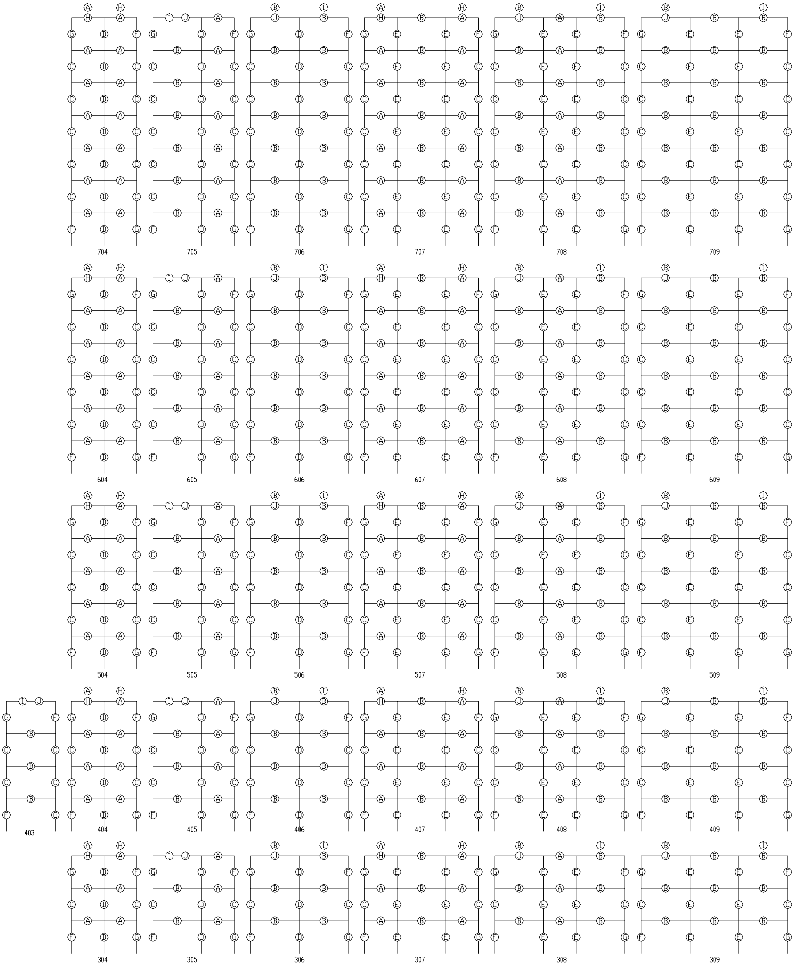
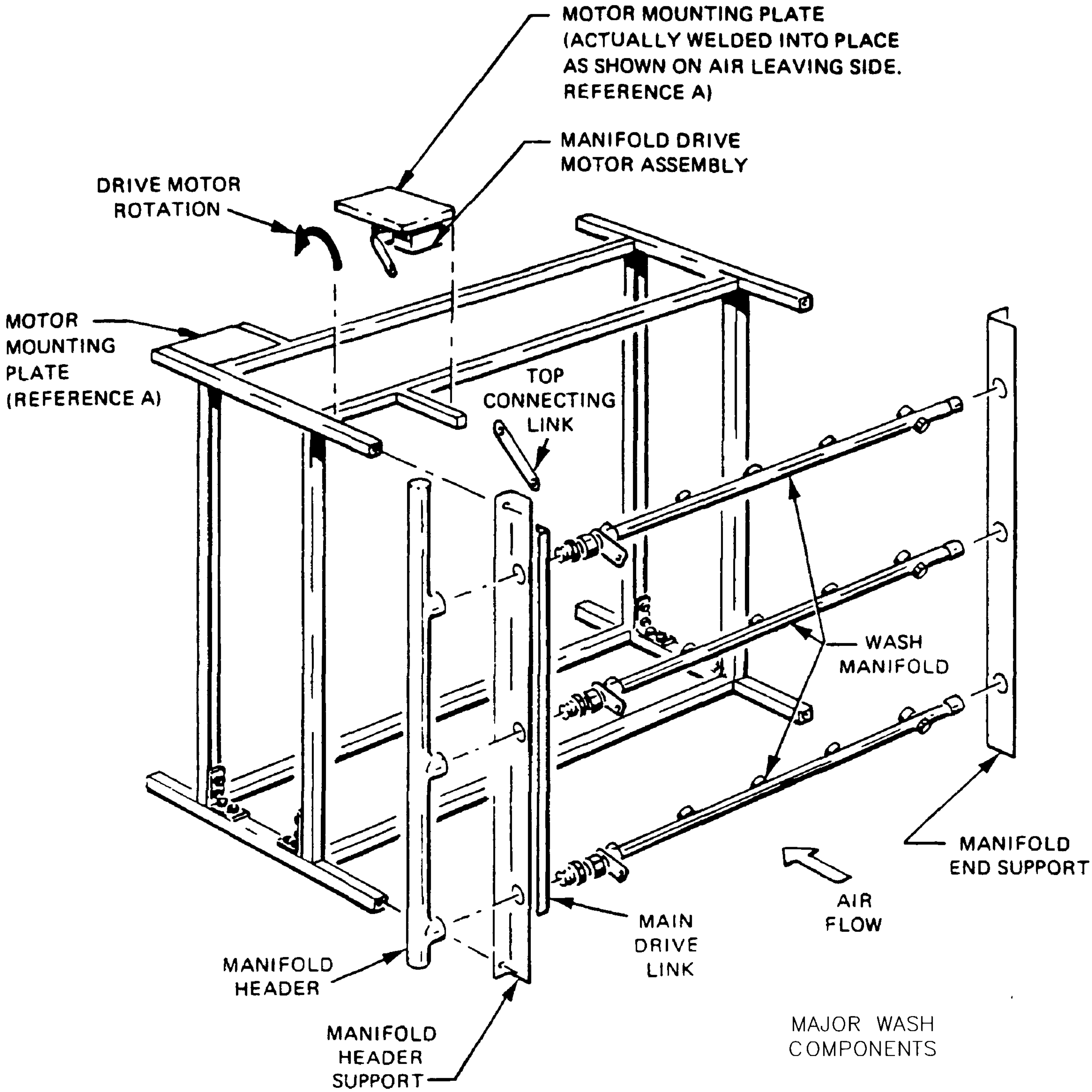


FIGURE 8A

SEE FIGURE 8 FOR TYPICAL ILLUSTRATION

MODEL60-LF8-2



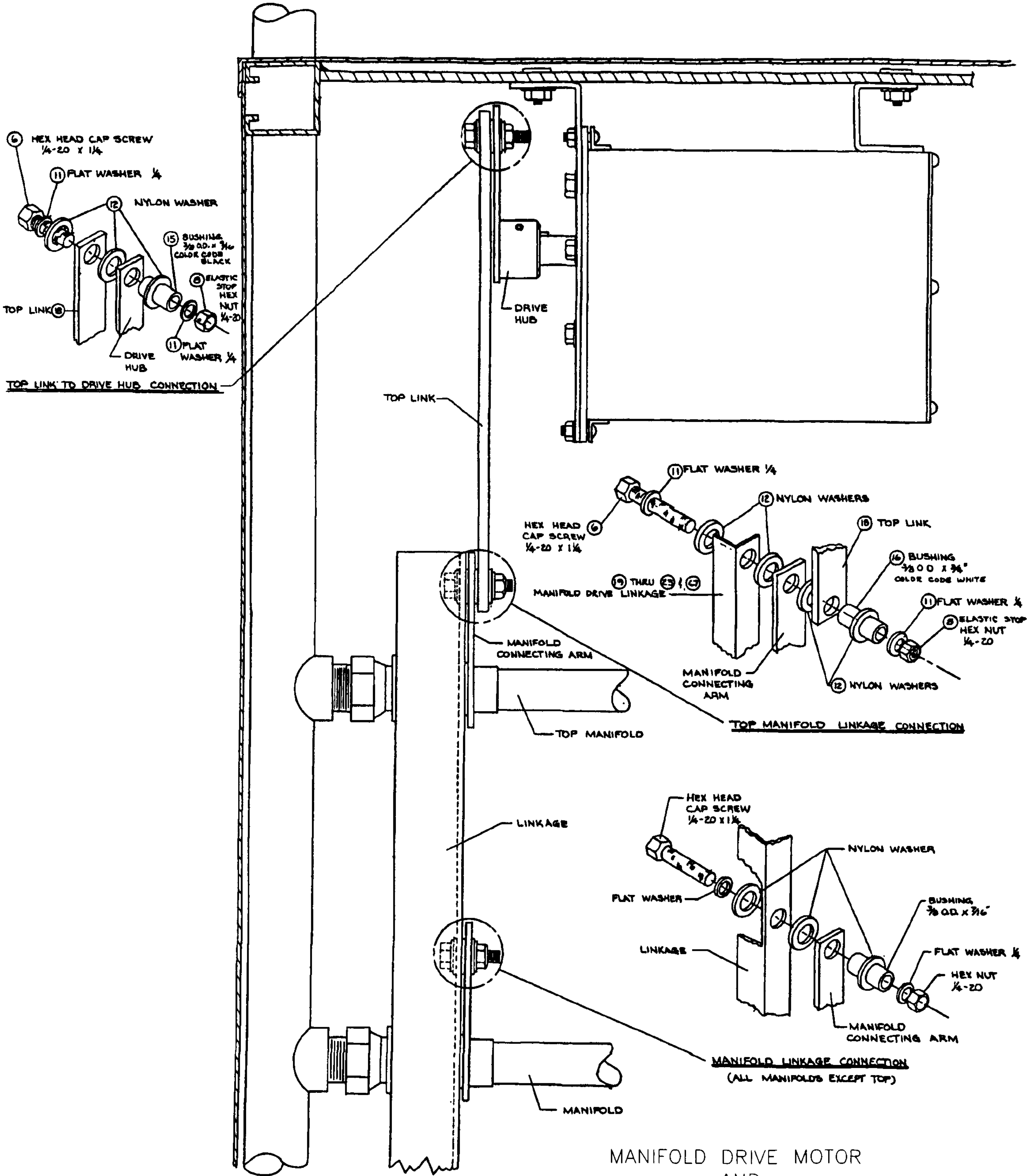
MAJOR WASH
COMPONENTS

NOTE:

1. TYPICAL 3 CELL HIGH, LEFT HAND UNIT.
2. ILLUSTRATION COVERS COMPONENTS ON AIR ENTERING SIDE ONLY. AIR LEAVING SIDE COMPONENTS ARE IDENTICAL AND IN REVERSE OF THOSE SHOWN.

FIGURE 9

MODEL60-LF9



MANIFOLD DRIVE MOTOR
AND
LINKAGE ASSY.

FIGURE 10

Model 60 Control Schematic

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DETAILED SCHEMATIC DRAWINGS WILL BE PROVIDED
BASED ON THE SIZE AND CONFIGURATION
OF YOUR UNIT ORDERED.

FIGURE 11

Model 60 Field Wiring

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DETAILED FIELD WIRING DRAWINGS WILL BE PROVIDED
BASED ON THE SIZE AND CONFIGURATION
OF YOUR UNIT ORDERED.

FIGURE 12

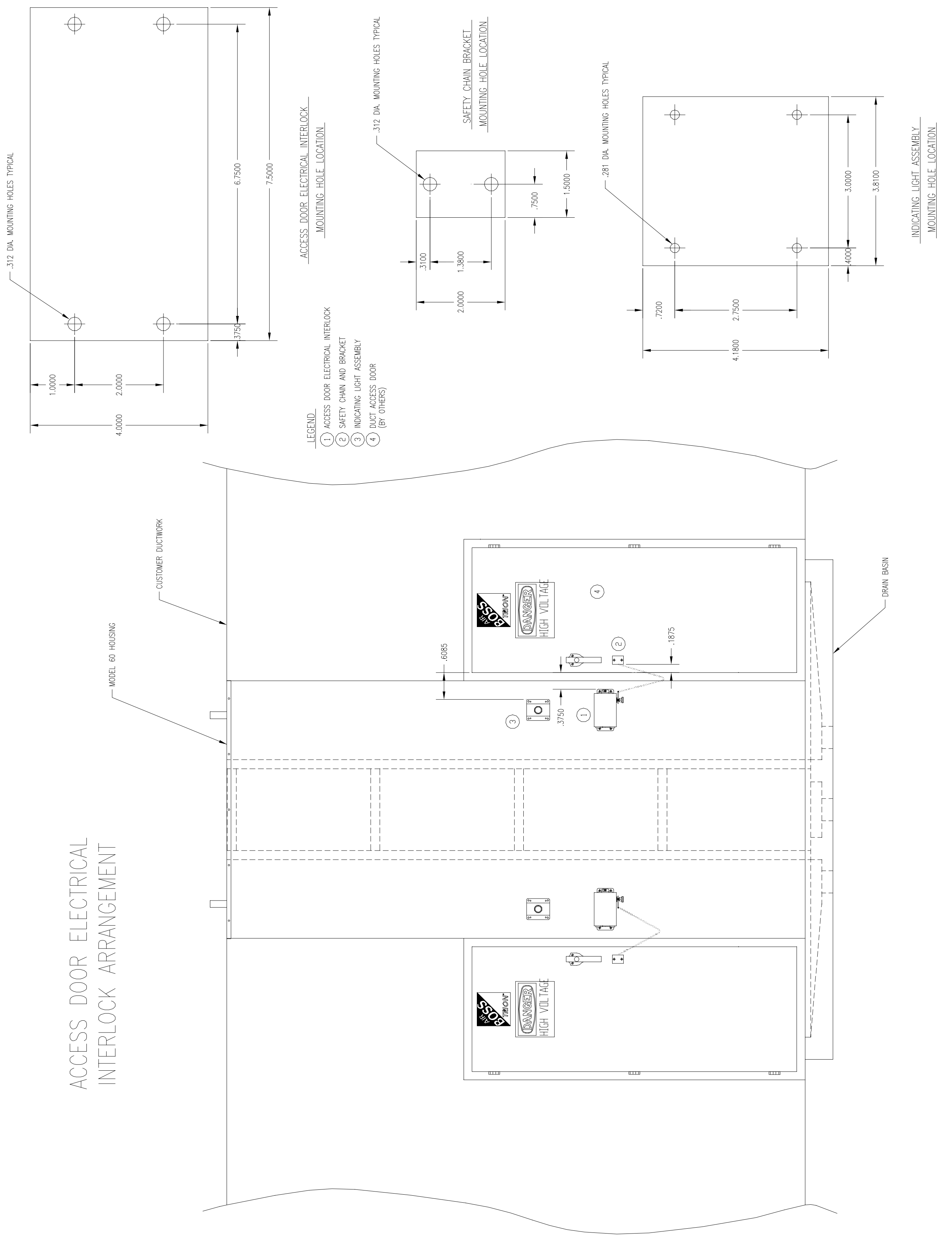
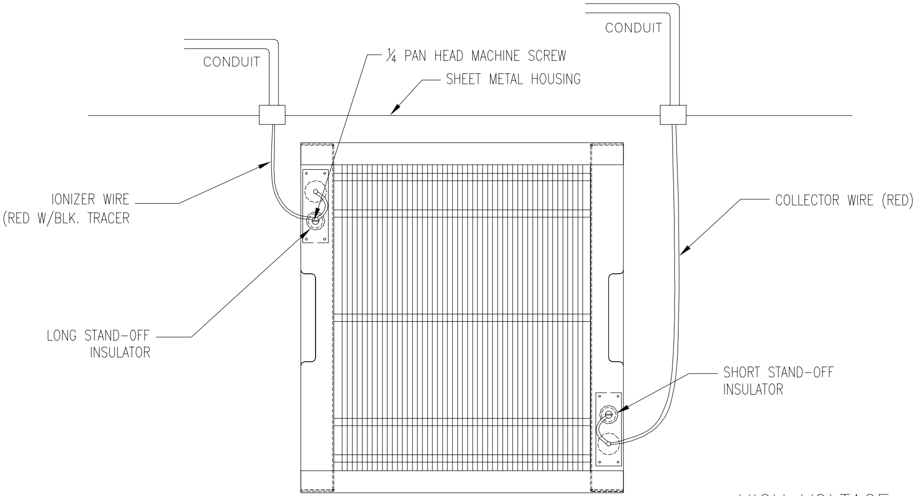


FIGURE 13

MODEL60-LF13

HIGH VOLTAGE CELL

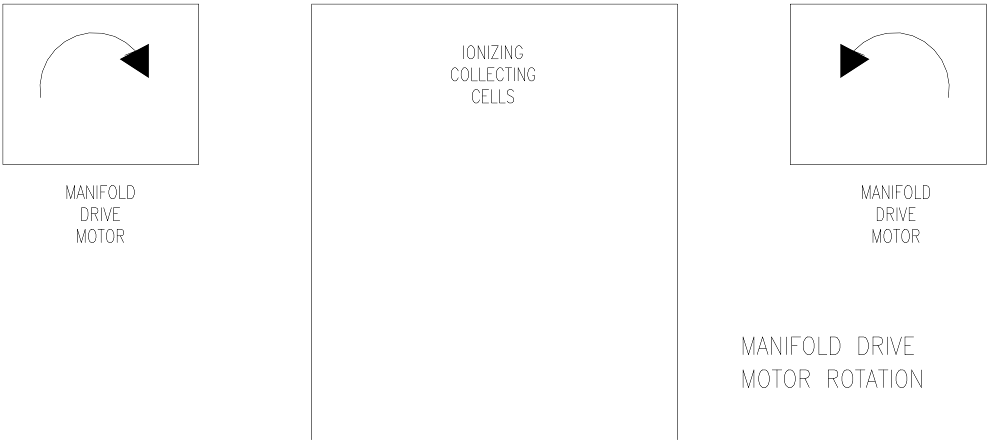


HIGH VOLTAGE
TERMINATION AT
IONIZING-COLLECTOR CELL

FIGURE 14A

NOTE: MANIFOLD DRIVE MOTORS MUST ROTATE (OVER THE TOP-TOWARD THE CELLS) AS SHOWN BELOW FOR PROPER OPERATION.

(MOTORS ARE REVERSIBLE-FACTORY WIRED AND MARKED AS SHOWN)



MANIFOLD DRIVE
MOTOR ROTATION

FIGURE 14B

MODEL60-LF14

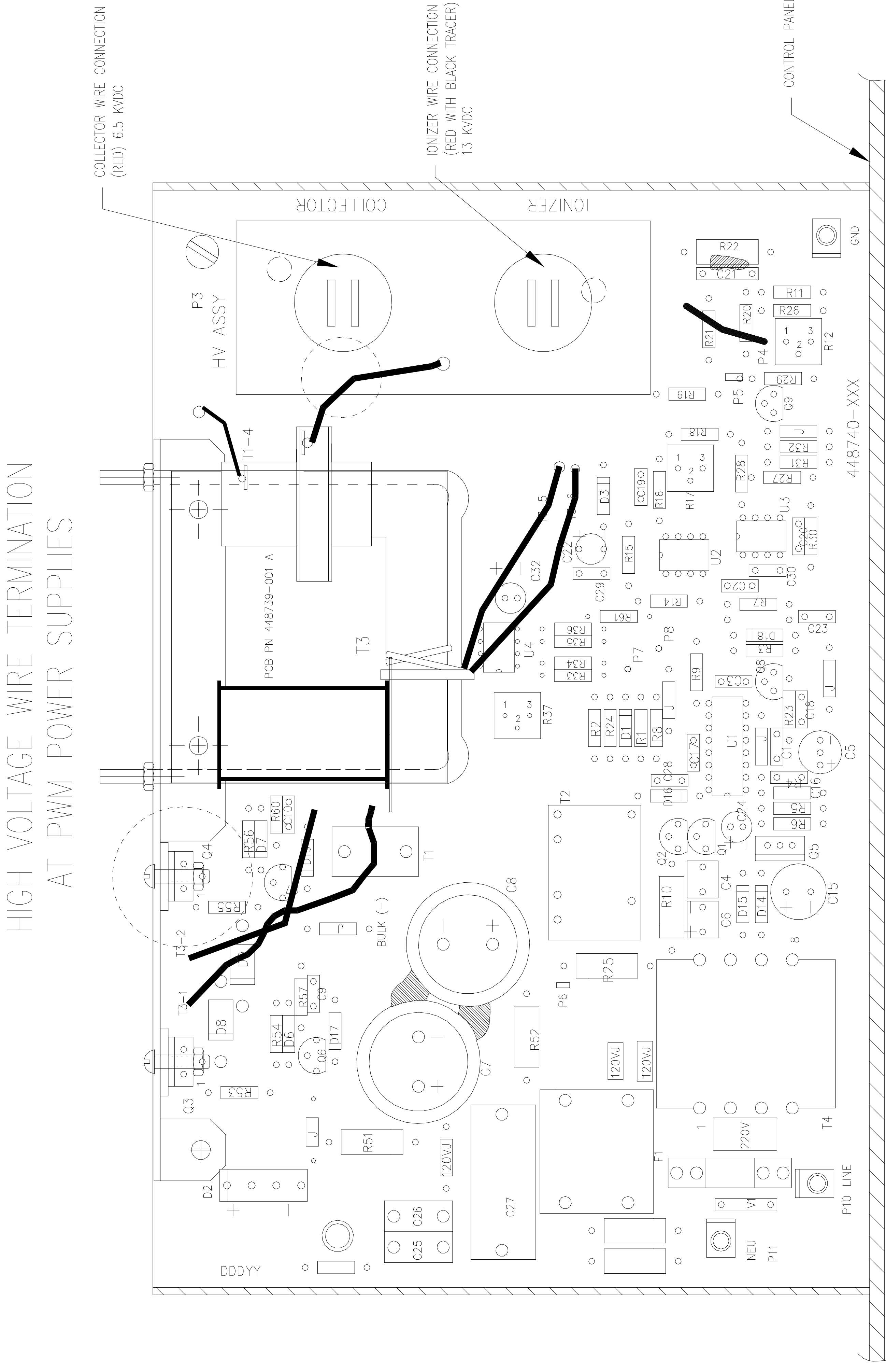


FIGURE 15

MODEL60-LF15